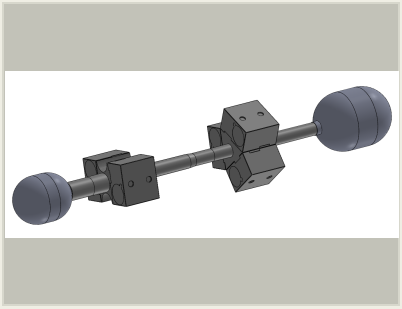
Thermoacoustic Radioisotope Generator (TRG), Phase II

Completed Technology Project (2017 - 2021)

Project Introduction

Nirvana Energy Systems (NES) has pioneered and is commercializing an innovative ThermoAcoustic Power Stick (TAPS) partially based on technology developed by Xerox Palo Alto Research Center (PARC) and NASA. NES has demonstrated and is building a 1kWe TAPS for use in remote power applications where reliability for 20+ years is of paramount importance. The novel TAPS technology has no hot moving parts and incorporates well proven, reliable linear motors and alternators in an engine based on the Stirling cycle. NES has designed, optimized, built and tested all sub-systems for reliability, ease of manufacturing and cost reduction over currently available Stirling engines. The 1kWe TAPS formed the starting design for scaling down to a ~300 W tunable power thermoacoustic device. The system is insensitive to radioisotope heat degradation, capable of 10+ years continuous operation, inexpensive to manufacture using well established methods, and yields greater than 25% thermal to electrical efficiency all while being designed for a specific power greater than 30 W/kg. The NES Thermoacoustic Radioisotope Generator (TRG) represents the ultimate in remote power devices and is the next step toward reliable dynamic power conversion for space. The technical objectives of the NES TRG Phase II effort are to produce a prototype TRG convertor, build a test cell, and validate the designed system performance with a minimum of 500 hours of steady state operation. During this 18 month effort, the TRG design will undergo any final modifications based on NASA review. Test support hardware will be selected and designed. The prototype and test cell will be manufactured to exact specifications. A risk assessment will be conducted for the convertor. Subsystem and materials coupon tests will be conducted. The TRG system will be assembled and tested for a minimum of 500 hours.



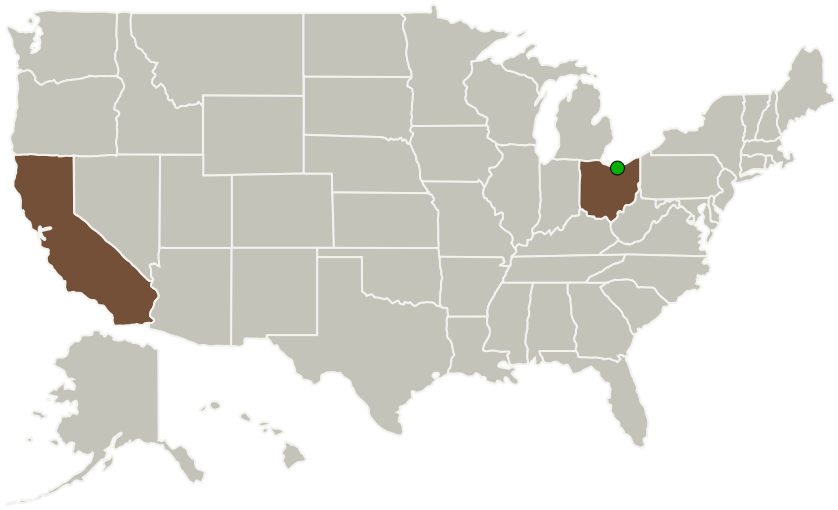
Thermoacoustic Radioisotope Generator (TRG), Phase II Briefing Chart Image

Table of Contents

Thermoacoustic Radioisotope Generator (TRG), Phase II

Completed Technology Project (2017 - 2021)

Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
Nirvana Energy Systems, Inc.	Lead Organization	Industry	Portola Valley, California
Glenn Research Center(GRC)	Supporting Organization	NASA Center	Cleveland, Ohio

Primary U.S. Work Locations	
California	Ohio

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Nirvana Energy Systems, Inc.

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

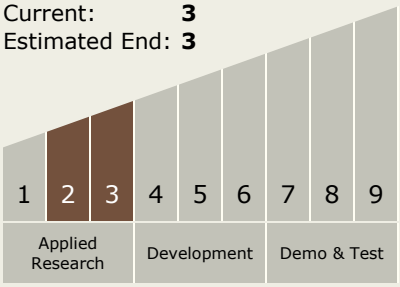
Carlos Torrez

Principal Investigator:

Frank Ritzert

Technology Maturity (TRL)

Start: **2**
Current: **3**
Estimated End: **3**



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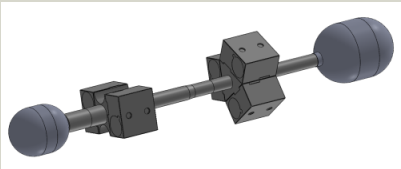
Images



Briefing Chart Image
Thermoacoustic Radioisotope Generator (TRG), Phase II Briefing Chart Image
(https://techport.nasa.gov/image/135390)

Technology Areas

Primary:

- TX03 Aerospace Power and Energy Storage
  - TX03.1 Power Generation and Energy Conversion
    - TX03.1.2 Heat Sources

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System